



# FRANCE ATTRACTIVENESS SCOREBOARD

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RESEARCH AND INNOVATION

# RESEARCH AND INNOVATION

**In the race for economic development, the ability to innovate is essential. Investment in research and development (R&D) and high tech plays a crucial role in competitiveness between developed countries. The productivity gains made possible by innovation and the spread of new technologies support the growth and competitiveness of the economy.**

**France has an environment conducive to research and innovation; it is the sixth country in the world for R&D spending, third in our sample in terms of the number of researchers among the working population and fourth in terms of patent applications. The research tax credit has enabled French research to remain at a very competitive level, similar to that of other advanced economies.**

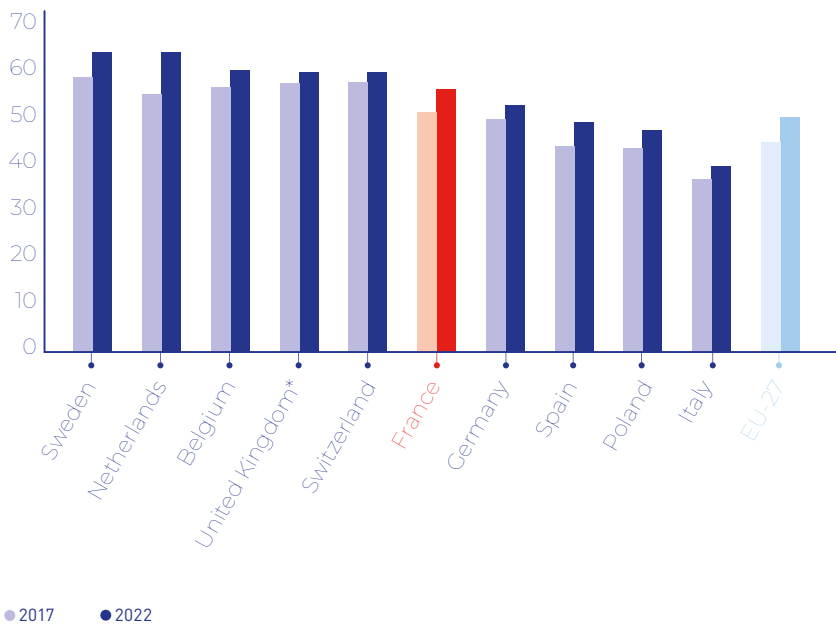
**The richness and dynamism of a country's research ecosystem promote synergies and are factors of attractiveness for technology intensive companies.**

Human resources in science and technology (HRST) are one of the main drivers of knowledge-based economies. In addition to higher education graduates, they include people employed in a scientific or technological position for which a high level of skill is required.

France is one of the countries where the share of HRST in the active population accounted for more than half of the active population in 2022 (55.8%), after the United Kingdom (59.1% in 2019), but ahead of Germany (52%).

**FIG. 1**

HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY (2022)  
% OF ECONOMICALLY ACTIVE 25- TO 64-YEAR-OLDS



\* Data for the United Kingdom are for 2017 and 2019

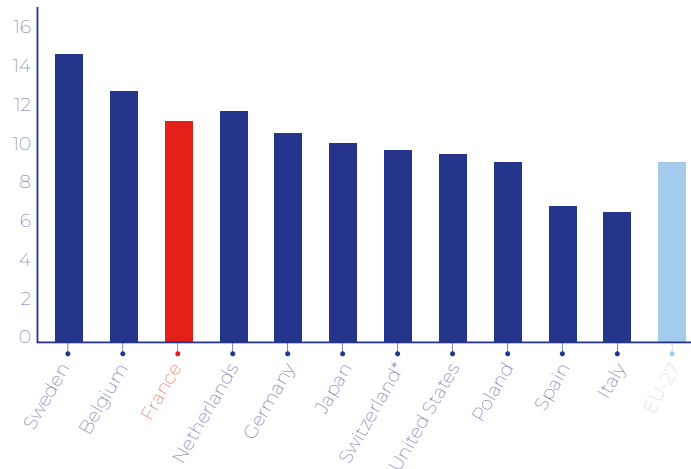
Sources: Eurostat, 2023

**France is also very well positioned when it comes to the number of researchers:** it had 11 researchers per 1,000 active people in 2020, placing it in third position in our sample and above the European average. The level observed in Germany was lower, with 10.4 researchers per 1,000 workers, just like in the United States (9.3), Spain (6.4) and Italy (6.2).

In terms of vocational training, France is committed to investing in people’s skills, in particular through the Freedom To Choose One’s Professional Future Act. **France is therefore one of the only countries in the world to offer a personal training account**, funded each year to the tune of €500 for full-time employees up to a maximum payment of €5,000, and increased by €800 up to a maximum of €8,000 for the least qualified.

**FIG. 2**

NUMBER OF RESEARCHERS (2020)  
PER THOUSAND LABOR FORCE



\* Data for 2019

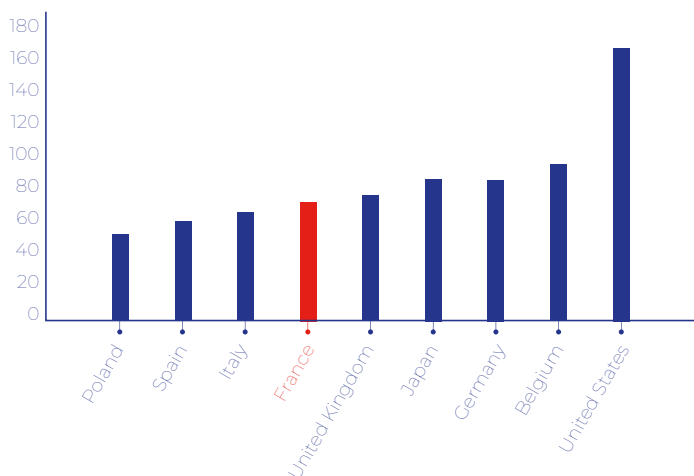
Sources: OECD; Business France calculations

The cost of researchers is an index put together by the National Research and Technology Association (ANRT), which allows for the cost of a researcher in their country of location to be calculated, taking into account the support systems available for R&D. The index compares the cost of a researcher in France excluding public support (base=100), with the cost of a researcher employed in the comparison countries with state aid. The cost of a researcher in France, taking into account the research tax credit and state benefits, therefore amounts to 73% of the cost excluding all state aid.

**Thanks to the research tax credit, the cost of researchers remained very competitive in 2021 and was ranked fourth in our sample ahead of the United Kingdom (74), Germany (86) and the United States (163). Salaries (index=100) remain attractive for researchers in France.**

**FIG. 3**

COST OF A RESEARCHER (2021)  
(RESEARCH TAX CREDIT 2020)  
INDEX BASE 100 = FRANCE, EXCLUDING THE RESEARCH TAX CREDIT AND GRANTS

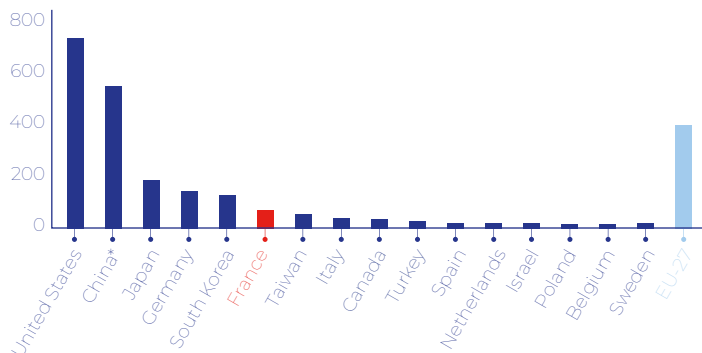


Source: International comparison of the cost of a researcher –  
French National Research and Technology Association (ANRT), 2021

The amount of gross domestic expenditure on R&D (GERD) invested by France in 2021 was nearly US\$64 billion. France is the sixth country in the world to have invested the most in research after the United States (US\$709 billion), China (US\$525.7 billion in 2019), Japan (US\$172 billion), Germany (US\$129 billion) and South Korea (US\$110 billion). The amount of this expenditure is the main indicator of the effort made in a country to support innovation and R&D.

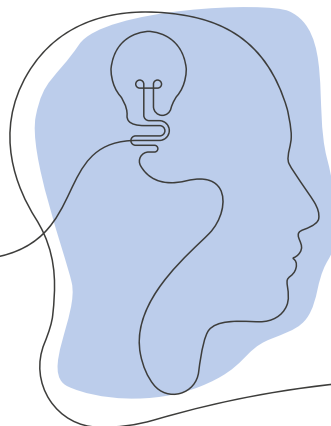
**FIG. 4**

GROSS DOMESTIC EXPENDITURE ON R&D (2021)  
15 LEADING GLOBAL ECONOMIES  
US\$ BILLION AT CURRENT PRICES AND PPP



\* The most recent data for China date from 2019

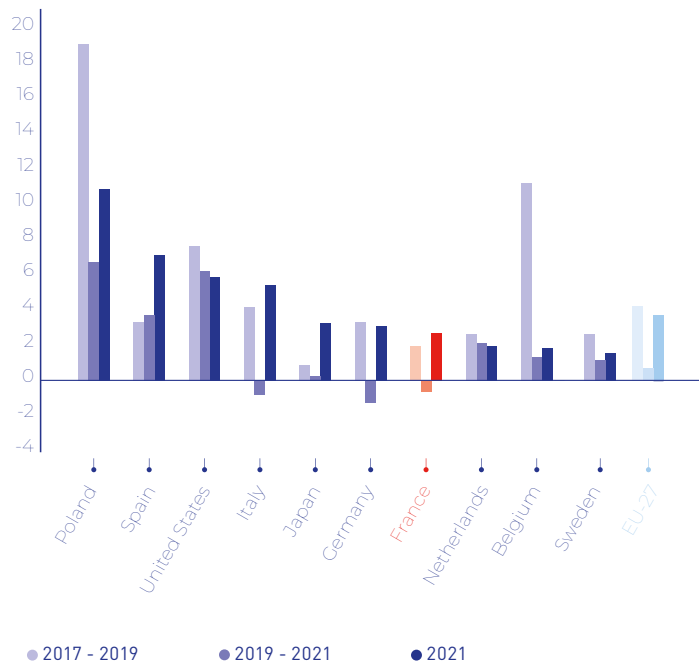
Source: OECD, 2022



In terms of change, **GERD in France increased by 2.5% in 2021**. Within the EU-27 countries, GERD was up by 3.6% in 2021.

**FIG. 5**

TRENDS IN GROSS DOMESTIC EXPENDITURE ON R&D  
REAL COMPOUND ANNUAL RATE OF GROWTH  
%



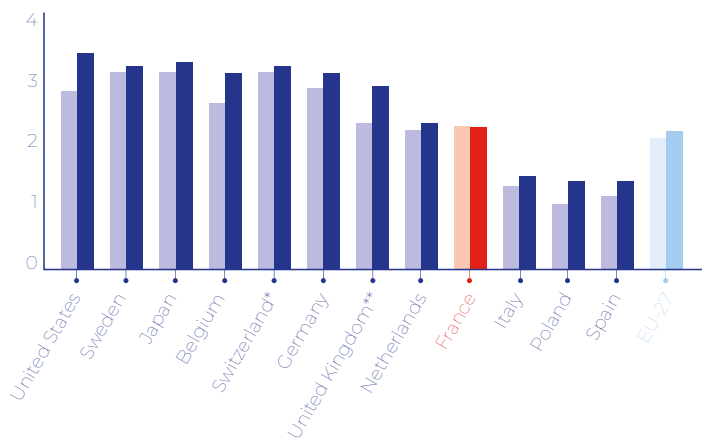
Source: OECD; Business France calculations, 2022



In 2021, the level of R&D activities (GERD and BERD expressed as a share of GDP) had been stable since 2016. **Gross domestic expenditure on R&D (GERD) amounted to 2.2% of GDP, while business enterprise R&D expenditure (BERD) was 1.45% of GDP.** These two indicators are within the EU-27 average (GERD: 2.1%; BERD: 1.49%). France is positioned ahead of Italy and Spain, but after the United States and Germany. In its Research Programming Act, France has committed to reaching 3% of GDP for research efforts by 2030 (see box).

**FIG. 6**

INTENSITY OF GROSS DOMESTIC EXPENDITURE ON R&D (GERD/GDP)  
% OF GDP



● 2016 ● 2021

\* Data compared for Switzerland are for 2015 and 2020

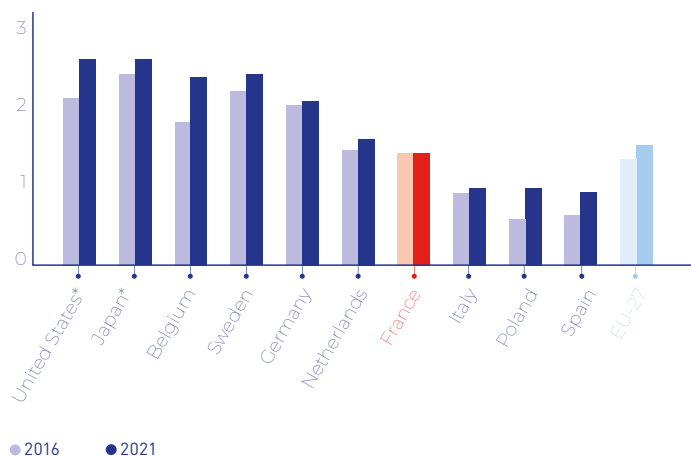
\*\* Data compared for the United Kingdom are for 2016 and 2020

Source: OECD, 2022



**FIG. 7**

INTENSITY OF BUSINESS ENTERPRISE R&D EXPENDITURE (BERD/GDP)  
% OF GDP



\* Data compared for the United States and Japan are for 2016 and 2020

Source: OECD, 2022

In France, the rate of public support for BERD is the highest among OECD countries. Direct (subsidies to businesses) and indirect (tax incentives) support for business research reached 0.42% of GDP in 2020. (OECD)

This support reflects the commitment of successive governments in the last fifteen years to promote a resolute policy of support for innovation which draws on a wide range of measures, notably the research tax credit, along with the “innovative new company” (*jeune entreprise innovante – JEI*) status, support from Bpifrance and the measures of the French government’s “National Investment Program”, among others (see inset).

The public sector is also a key player in research in France through public research organizations, such as the world-famous CNRS (National Center for Scientific Research). According to the Scimago Institutions Rankings, the CNRS was the third most important research institution in terms of the number of scientific publications in 2022, after the Chinese Academy of Science and the Ministry for Education for the People’s Republic of China.

## MEASURES FOR PROMOTING INNOVATION IN FRANCE

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France's research tax credit is a tax-incentive scheme to support business R&D, open to businesses of any size and from any sector. The tax credit amounts to 30% of R&D expenses up to €100 million and 5% of expenditure beyond this threshold. The personnel costs of researchers and research technicians form part of the basis for calculating the tax credit. The hiring of young researchers on permanent contracts at the end of their doctorate is also strongly encouraged. In 2013, the research tax credit was extended to innovation expenditure for SMEs through the innovation tax credit (*crédit d'impôt innovation*) (rate of 20%, applicable to a base limited to €400,000): the expenditure is related to activities linked to prototype design or pilot installations of new products.

The "France 2030" Plan aims to sustainably transform key sectors of the economy through technological innovation. Some €54 billion will be invested in businesses, universities and research organizations, 50% of which are reserved for emerging players who are driving innovation.

Since 2004, the status of "innovative new company" has conferred on SMEs less than eight years old that incur R&D expenditure representing at least 15% of their costs a certain number of tax advantages (exemption from tax on profits and capital gains, total exemption from certain employers' social security contributions, etc.) There is also a "new university company" status, which aims to encourage the creation of a business by anyone involved in research work at higher education institutions.

The 2021-2030 Research Programming Act seeks to revitalize research in France and enhance the attractiveness of careers in this field. With €25 billion and a target of 3% of GDP devoted to R&D by 2030, this program

aims, among other things, to facilitate the entry of young researchers into the labor market, to enhance the careers of research players and to strengthen the dissemination of research in the economy and society.

Launched in 2004, France's innovation clusters bring together innovation players on a given theme in the same region. There are some 54 innovation clusters spread across the country, with an emphasis on the transfer of knowledge and technology between public-sector research and businesses.

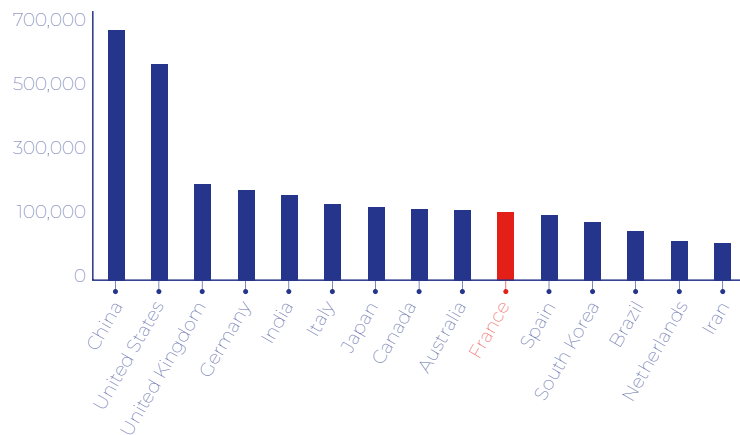
The Fund for Industry and Innovation, which was given €10 billion in 2018, aims to guarantee France's scientific and technological sovereignty, as well as its economic development. Focused on breakthrough innovation, it benefits from €250 million per year to spend on "Major Challenges", in particular sectors with high technological and societal risks (artificial intelligence, cybersecurity, mobility, health). It also supports the growth and development of startups specializing in deep tech.

The Carnot Institutes: The Carnot accreditation promotes partnership research, or the conduct of research carried out by public laboratories in partnership with businesses. The Carnot institutes receive funding from the National Research Agency calculated according to the volume of revenue derived from research contracts with their partners in particular businesses. The institutes are brought together within the Carnot network. Today there are 39 Carnot institutes located throughout France.

These investments in the research environment have enabled France to appear among the leading economies in the world in terms of its R&D performance. French researchers contributed to **more than 100,000 scientific publications in 2021, putting France 10th in the world and fourth in Europe** in terms of production of scientific knowledge.

**FIG. 8**

NUMBER OF SCIENTIFIC PUBLICATIONS TO WHICH AT LEAST ONE AUTHOR IN THE COUNTRY CONTRIBUTES FOR THE 15 LEADING COUNTRIES (2021)

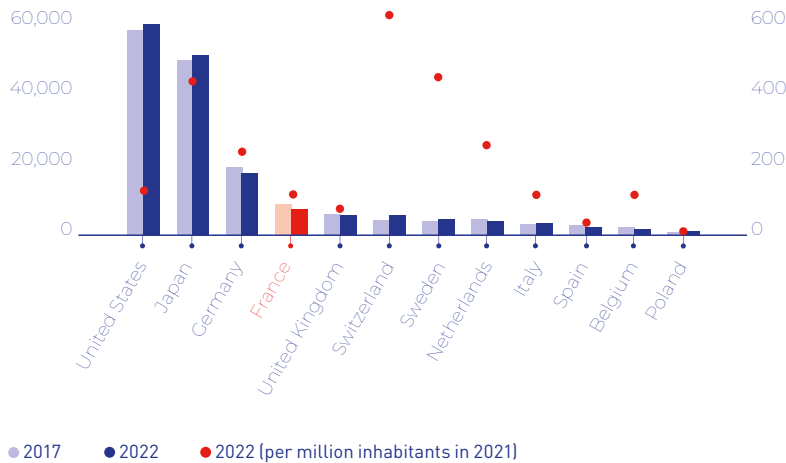


Source: OST database, Web of Science, HCERES-OST calculations

The number of patent applications filed under the international PCT (Patent Cooperation Treaty) procedure reveals the dynamism and performance of a country's research stakeholders. **France is the fourth country in our sample (second in Europe) for the number of patent applications filed in 2022.** With 7,759 patent applications filed, France is after the United States (58,716), Japan (50,355) and Germany (17,515), but ahead of the United Kingdom (5,741) and Switzerland (5,376). Relative to the total population, France had 115 patent applications per million inhabitants in 2021.

**FIG. 9**

PATENT APPLICATIONS FILED VIA THE PCT PROCEDURE  
PRIORITY YEAR, INVENTOR'S COUNTRY OF RESIDENCE



Source: WIPO statistics database; OECD; Business France calculations, 2023

# Methodology

## Patents as indicators of innovation activity

A patent is an industrial property title which gives its holder an exclusive right to exploit the patented invention, for a limited period (generally 20 years) and in a specific territory. Patent applications may only concern the national territory, or cover a wider territory (European Union countries, for example, in the case of applications filed with the European Patent Office). A patent can also be filed under the PCT procedure, according to the Patent Cooperation Treaty. This treaty “allows you to request patent protection for an invention simultaneously in a large number of countries by filing an ‘international’ patent application.” Since March 2017, 152 Member States have joined the Treaty, placing the PCT at the heart of international cooperation for intellectual property. This procedure has the advantage of improving international comparability in terms of patents.

## Foreign investors attracted by the French innovation ecosystem and its international opportunities invested in research in France in 2022

**Larsen & Toubro:** The engineering subsidiary of the Indian group L&T has opened an engineering and R&D center in Toulouse (Occitanie region). It plans to recruit 50 people within the next year and around 100 people within three years as part of an investment of around €2 million. The main idea for this center in Toulouse is to serve the group’s customers in the aerospace industry in both France and Europe.

**Liberty Com Systems:** This Tunisian startup has developed technologically and operationally innovative solutions oriented towards telecommunications. For its development, it chose to set up its operational holding business in Nice, mainly for the ecosystem surrounding startups, particularly that relating to telecoms, as well as for its proximity to Tunisia. LCS’s aim is to develop its activity internationally from France, starting with Europe. It has just completed its first fundraising round (to the tune of €3 million). The startup plans to create 26 jobs over the next three years.

**Intel:** In March 2022, the American giant announced its intention to build its new European R&D hub, creating 1,000 high-tech jobs mainly on the Plateau de Saclay (Ile de France/Paris region) within the next ten years. France will become Intel’s European headquarters for R&D in high-performance computing (HPC) and artificial intelligence. Innovation in these disciplines will benefit a wide range of sectors, including automotive, agriculture, climate, new drug development, energy, genomics, life sciences and security sectors, significantly improving the life of all Europeans.

Additionally, Intel plans to establish its main European design center in France for its foundry business, which will provide design services and design guarantees to French, European and global industrial partners and customers.

## Methodology

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Economic attractiveness can be defined as the ability to attract new business and mobile factors of production (capital, skilled labor, etc.) to a specific destination. This ability is related to a wide range of macroeconomic criteria.

This booklet takes its place in a set of themes that address different determinants of attractiveness in the form of a comparison of the main European economies competing with France: Belgium, Finland, Germany, Italy, the Netherlands, Poland, Spain, Sweden, Switzerland and the United Kingdom, as well as Japan and the United States.

